CLAIMS

1. A method of managing heat from an engine for a vehicle, the method comprising:

providing airflow over a surface of a heat exchanger circulating coolant used to cool the engine, said airflow rejects heat from the heat exchanger; and

wicking water over the heat exchanger to supplement the cooling capacity of the airflow by evaporative cooling.

2. The method according to claim 1 further comprises supplying the water from a water storage volume provided by void spaces around fuel storage tanks of the vehicle.

3. The method according to claim 1, wherein the water is used to supplement cooling of the heat exchanger under peak power and/or hot day conditions when the cooling capacity of the heat exchanger is not sufficient.

4. The method according to claim 1 further comprises using exhaust gases or coolant flow from the engine under sub-zero ambient temperatures to provide heat to at least a portion of a water storage volume holding the water and to supply lines supplying the water to the heat exchanger.

5. The method according to claim 1 further comprises condensing vapor exhaust of the engine to provide the water.

6. The method according to claim 1 wherein the engine is an electrochemical engine and the method further comprises condensing vapor exhaust of the electrochemical engine to provide the water, and providing the water when the cooling capacity of the airflow needs to be supplemented.

7. The method according to claim 1, wherein the engine is an electrochemical engine and vapor exhaust of the electrochemical engine is condensed and stored during low power and/or cold day conditions when the cooling capacity of the heat exchanger is

more than adequate in order to provide a supply of the water when the cooling capacity of the airflow needs to be supplemented.

8. The method according to claim 1 wherein the engine is an electrochemical engine and the method further comprises condensing vapor exhaust of the electrochemical engine to provide the water, wherein at least a portion of the vapor exhaust is directed through a condenser when the heat exchanger has excess capacity.

9. The method according to claim 1 wherein the engine is an electrochemical engine and the method further comprises condensing vapor exhaust of the electrochemical engine to provide the water, and storing the water in a water storage volume provided by void spaces around fuel storage tanks of the vehicle.

10. The method according to claim 1 further comprises supplying the water to forward and rearward wicking mechanism portions of the heat exchanger during warm weather conditions and to only the rearward wicking mechanism portion during near freezing weather conditions and below.

11. The method according to claim 1 further comprises supplying the water from a water storage volume provided by void spaces defined in substantially rectangular volumes surrounding substantially cylindrical fuel storage tanks of the vehicle.

12. The method according to claim 1, wherein the water is wicked over the heat exchanger by providing a supply of water in fluid connection with a wicking mechanism (material or structure).

13. The method according to claim 1, furthering comprising spraying at least a portion of the water on the heat exchanger.

14. A thermal management system of an engine for a vehicle, comprising:

a coolant pump;

a radiator comprising a wicking mechanism and having an associated fan to provide airflow over the wicking mechanism;

a coolant circuit circulating coolant used to cool the engine, said coolant circuit fluidly connecting the engine, the coolant pump, and the radiator; and

a supply of water in fluid connection with the wicking mechanism to supplement the cooling capacity of the airflow by evaporatively cooling.

15. The thermal management system according to claim 14, wherein said supply of water is from a water storage volume provided by void spaces around fuel storage tanks of the vehicle.

16. The thermal management system according to claim 14, wherein the supply of water is used to supplement cooling of the heat exchanger under peak power and/or hot day conditions when the cooling capacity of the heat exchanger is not sufficient.

17. The thermal management system according to claim 14, wherein exhaust gases or coolant flow from the engine are operatively directed under sub-zero ambient temperatures to provide heat to at least a portion of the supply of water and to supply lines supplying water to the wicking structure.

18. The thermal management system according to claim 14 further comprises a condenser to condense water from vapor exhaust of the engine to provide the supply of water.

19. The thermal management system according to claim 14, wherein the engine is an electrochemical engine, and at least a portion of a vapor exhaust of the electrochemical engine is operatively directed through the condenser for condensing water to provide the supply of water when the radiator has excess capacity.

20. The thermal management system according to claim 14, wherein the wicking mechanism is provided at a portion of the radiator away from an air receiving side of the radiator, and in a region which experiences above freezing temperatures (i.e., > 0°C) during normal operating conditions of the engine when the vehicle is subject to a freezing ambient temperature.

21. The thermal management system according to claim 14, wherein the wicking mechanism is provided at forward and rearward portions of the radiator, the forward portion being on an air receiving side of the radiator, and the rearward portion being away from the air receiving side of the radiator and in a region which experiences above freezing temperatures during normal operating conditions of the engine when the vehicle is subject to a freezing ambient temperature.

22. The thermal management system according to claim 21, wherein the supply of water is operatively directed to the wicking mechanism of the forward and rearward portions of the radiator during warm weather conditions and to only the wicking mechanism on the rearward portion of the radiator during near freezing weather conditions and below.

23. The thermal management system according to claim 14, wherein said water storage volume is provided by void spaces defined in substantially rectangular volumes surrounding substantially cylindrical fuel storage tanks of the vehicle.

24. The thermal management system according to claim 14, wherein said supply of water is from a water storage volume provided by void spaces around hydrogen storage tanks in a rear underbody compartment of the vehicle forward of a rear axle of the vehicle.

25. The thermal management system according to claim 14, wherein said wicking mechanism is selected from the group consisting of wicking fibers, wicking felts, wicking polymers, wicking metals, and combinations thereof.

26. The thermal management system according to claim 14, wherein said wicking mechanism is fins of the radiator with a porous surface.

27. The thermal management system according to claim 14, wherein the vehicle includes a fuel cell stack and the coolant circuit is fluidly connecting to the fuel cell stack.

28. The thermal management system according to claim 14, wherein the engine comprises a fuel cell stack and the coolant circuit is fluidly connecting to the fuel cell stack.

29. The thermal management system according to claim 14, wherein at least a portion of the fluid connection between the supply of water and the wicking mechanism is provided by a pump used to spray the water onto the radiator.